MAUL FOSTER ALONGI

2001 NW 19th Avenue, Suite 200 | Portland, OR 97209 | 971 544-2139 | www.maulfoster.com

June 19, 2017
Project No. 8128.02.09

Dana Bayuk
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Re: NW Natural DNAPL Monitoring Summary Report - 2016

Dear Mr. Bayuk:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi (MFA) has prepared the following letter providing comments on the recently issued DNAPL Monitoring Summary – 2016 (the report), prepared by Anchor QEA, LLC (AQ) on behalf of NW Natural (NWN), dated April 7, 2017. The objective of the report was to provide an evaluation of data to support changes to the DNAPL[1] monitoring program required as a component of the hydraulic control/containment (HC/C) system.

MFA also reviewed the April 7, 2017 transmittal memorandum (regarding the use of TarGOST technology as a component of the HC/C DNAPL monitoring program per Department of Environmental Quality requirements) that accompanied the report. The memorandum provided conclusions regarding the potential applicability of using TarGOST technology to differentiate between mobile and non-mobile (aka residual) DNAPL.

In general, MFA finds that the report provides supportable recommendations for DNAPL monitoring as it relates to the ongoing operation of the HC/C system. The report, however, presents only a partial view of a highly heterogeneous and variable data set that reflects the significant complexity, unpredictability, and size of the DNAPL impacts at the site. Comments regarding the specific sections of the report and memorandum follow.

Section 2.1 – DNAPL Occurrence

This section of the report provides an overview of only a subset of the wells or borings where the presence of DNAPL has been documented on the GOU (which includes Gasco and Siltronic properties), and this report therefore does not provide a comprehensive understanding of the nature and extent of DNAPL.

[1] For the purposes of this comment letter, DNAPL is intended to identify dense, non-aqueous phase liquid characteristic of former Portland Gas & Coke manufacturing and/or refining operations.

This section omits evaluation of many of the wells on the Siltronic property that are monitored by MFA on behalf of Siltronic, which also contain observable DNAPL. Observations of DNAPL thickness in wells monitored by MFA are provided regularly in monthly progress reports submitted to DEQ, and provided to NWN. Wells that currently contain observable accumulations of DNAPL include WS-31-106, WS-43-36, WS-33-81, and WS-15-85 (see attached table and figure). These wells are not mentioned in the report. WS-15-85 and WS-31-106 are shown in Figure 1 of the report, however, WS-31-106, where DNAPL thicknesses up to 26 feet have been observed, is labeled as a being "outside the Interpreted Extent of DNAPL within the Upper Alluvium". Former monitoring well WS-11-125 (which had DNAPL accumulations observed in 2003-2004 and reported in the 2004 Final Remedial Investigation Workplan[2]) is also shown as outside of the Interpreted Extent. This indicates that the Interpreted Extent presented by NWN is inaccurate, and that inclusion of all monitoring wells is necessary for a comprehensive understanding of DNAPL mobility on the site.

DNAPL has been observed in 13 of the 57 wells (approximately 23 percent) installed by MFA within the former PG&C waste lagoon footprint, independent of depth. Page 2 of the report identifies three categories of extraction wells and three categories of monitoring wells. The utility for this categorization (or potential decisions based on these criteria) is not clear; MFA notes that generally, there are only two categories of wells – those in which DNAPL has been observed, and those in which it has not yet been observed.

On page 2 of the report, regarding former monitoring well WS-14-161, AQ states: "The well was decommissioned by Maul Foster and Alongi on February 15, 2015, because it was penetrating the Lower Aquitard and may have been providing a preferential pathway to the Deep Lower Alluvium." MFA notes the following regarding this statement:

- The design, location, and construction of WS-14-161 were directed and approved by DEQ[2].
- The presumed Lower Aquitard has not been demonstrated to be laterally continuous. Nor has the presumed Lower Aquitard been demonstrated to be lithologically different from other, shallower lower-permeability layers that have also not prevented downward vertical flow of DNAPL.
- Down-hole video from WS-14-161,[3] which is screened from 145 to 160 feet below ground surface, demonstrates DNAPL entry into the well screen at approximately 154 to 158 feet below ground surface, which is below the presumed Lower Aquitard. Examination of this video does not support the conclusion that that the well was

[2] MFA. 2004. Final remedial investigation workplan, Siltronic Corporation site, 7200 NW Front Avenue, Portland, Oregon. September 17.

[3] MFA. 2014. Transmittal (re: DVDs for video inspection of WS14-125/161) to D. Bayuk, Oregon Department of Environmental Quality, Portland, Oregon, from K. Gallagher, Maul Foster & Alongi, Inc., Portland, Oregon. April 25. Video available at https://youtu.be/IftHBzmf4vw

providing a preferential pathway, but instead suggests that DNAPL had penetrated the Lower Aquitard.

Section 2.2 – DNAPL Entering Wells

The data reviewed and presented in this section demonstrate that DNAPL entry or accumulation in wells is heterogeneous, unpredictable, and not correlated with HC/C extraction well pumping rates. Table 3 of the report demonstrates variability of accumulation rates, which range over three orders of magnitude between different wells. This variability in accumulation rates is observed in wells both proximal and distant from the HC/C system extraction wells, which indicates that heterogeneities in site geology and DNAPL properties may play a more significant role in determining accumulation rates than the operation of the HC/C system.

The text notes that accumulation rates of up to 50 gallons per year (GPY) have been measured in nearshore wells; Table 3 of the report identifies other wells with much higher accumulation rates. MFA notes that accumulation of 50 GPY correlates to an accumulation of approximately 0.84 feet per day in a 2-inch-diameter monitoring well. This is a significant rate of accumulation that indicates DNAPL is moving through the subsurface at relatively high rates.

The data presented in Section 2 confirm that mobile DNAPL is present throughout the data set of the monitoring wells evaluated. This is consistent with observations of DNAPL in wells on the Siltronic property that were not included in the evaluation (as noted above).

Section 3.3 – TarGOST Monitoring Summary and Conclusions

This section includes the following statements:

> "Data from the extraction well TarGOST borings and the TMA borings support the following conclusions:
>
> • Continued extraction well TarGOST borings are not needed because DNAPL mobilization adjacent to extraction wells has been observed based on changes in DNAPL accumulation rates at the extraction wells.
>
> • Continued TarGOST borings in the three TMAs are not needed because DNAPL has not been detected in any of the TMAs since the beginning of the DNAPL monitoring program."

The former conclusion indicates that accumulation of DNAPL in wells is a positive indicator of DNAPL mobility. The latter conclusion indicates that the absence of DNAPL detections based on TarGOST data may therefore represent an inconclusive or false negative result, relative to accumulation data. That is, the failure of the TarGOST technology to detect DNAPL does not contradict the conclusion (based on accumulation) that DNAPL is mobile or mobilized by the HC/C system.

This report concludes that ongoing TarGOST monitoring is no longer required for the purpose of evaluating increased mobility or mobilization of DNAPL by the HC/C system. MFA

concurs, but notes that TarGOST remains a useful tool for identifying the presence of DNAPL, and that discontinuation of TarGOST monitoring should not preclude the use of TarGOST in other investigations into the presence and extent of DNAPL. MFA also notes that due to the ongoing migration of DNAPL (regardless of the influence of the HC/C-induced gradients), TarGOST is of limited utility for identifying the absence of DNAPL. That is, locations where DNAPL is not detected by TarGOST may later be impacted by DNAPL.

Section 5 – Summary of Findings

This report concludes that DNAPL mobilization by the HC/C is only occurring in limited areas, proximal to the extraction wells, and that slow accumulation rates in two of three recovery wells indicate that DNAPL mobility or mobilization has not increased elsewhere. Due to the variability of DNAPL accumulation rates throughout the site, conflicting observations from three wells is not conclusive.

The summary section also includes the statement:

> "Regarding the extraction well TarGOST borings, results from one monitoring event to the next have not shown definitive evidence of DNAPL migration."

Consistent with the observation above regarding Section 2, it is not unreasonable to qualify this observation with the caveat that given the observed mobility of DNAPL throughout the site, absence of DNAPL cannot be assumed to be a permanent condition. This report further concludes that DNAPL proximal to the extraction wells is being captured by the HC/C wells. Correlations between pumping rates and DNAPL accumulation are present in only one extraction well, which indicates that any capture of DNAPL is largely incidental to the operation of the HC/C system and is occurring in a very small area adjacent to the extraction wells.

Transmittal Memorandum

The transmittal memo states that DEQ is interested in using TarGOST monitoring to differentiate mobile DNAPL from residual DNAPL. The memorandum explains the limitations to this approach (e.g. the waste tar products are weathered, the method is difficult to calibrate to this question, etc.). MFA agrees that the TarGOST method may not be appropriate for mobility assessment. However, the TarGOST method remains an accurate and effective tool for delineating the presence of DNAPL, and combined with observations of DNAPL accumulation in wells, this information could support FS data gaps related to the current extent of DNAPL.

More importantly, MFA notes that distinguishing between residual DNAPL and mobile DNAPL is of limited utility with respect to identifying hot spots. Per OAR 340-122, the definition of hot spots as "highly concentrated" means that residual DNAPL is a hot spot, irrespective of an assessment of its mobility. This is consistent with DEQ's approach for

evaluating NAPL present on the former RPAC property, as discussed in DEQ's April 7, 2017 review of the Second Revised Draft Feasibility Study Work Plan – OU1[4]. Furthermore, for the reasons cited in the memorandum, the limitations that prevent using TarGOST technology for determination of the residual/mobile nature of DNAPL are generally applicable throughout the Gasco and Siltronic sites. That is, absent other technological determinations which have yet to be demonstrated, it should be assumed that all DNAPL is mobile.

General Comment

Overall, the data suggest that DNAPL is mobile independent of the operation of the HC/C system, and the HC/C system has minimal influence on the mobility of DNAPL at the Gasco and Siltronic sites.

This is consistent with the expectations for the HC/C system, which was designed to minimize hydraulic gradients that could mobilize DNAPL[5]. Given that the data indicates that migration of DNAPL is occurring both near the riverbank and in the uplands, and that this migration is independent of the operation of the HC/C system, it is also reasonable to conclude that the HC/C system may only be effective for capturing DNAPL proximal to the extraction wells. This incidental capture of DNAPL adjacent to the extraction wells should not be considered to be preventing DNAPL migration from the uplands towards the Willamette River. Both the original system design and the data presented in this report support the conclusion that the HC/C system has little or no impact on the overall movement or mobility of DNAPL at the Gasco and Siltronic sites.

MFA appreciates the significant effort NWN has invested in investigating this significant issue on the NWN and Siltronic properties. Please contact either of us if you have any questions.

Sincerely,

Maul Foster & Alongi, Inc.

James G.D. Peale, RG
Principal Hydrogeologist

Courtney Savoie, RG
Project Geologist

[4] DEQ. 2017. Letter (re: DEQ review "second revised draft-feasibility study work plan-operable unit 1" Rhone-Poulenc Site-Portland Site, ECSI 155) to M. Bogdon, StarLink Logistics, Inc., Bridgewater, New Jersey, from M. McClincy, Oregon Department of Environmental Quality, Portland, Oregon. April 19.

[5] AQ. 2012. Revised groundwater source control construction design report, NW Natural Gasco site, prepared for NW Natural. Anchor QEA, LLC, Portland, Oregon. January.

cc: (electronic)
Myron Burr, Siltronic Corporation
Ilene Munk, Foley & Mansfield
David Rabbino, Jordan Ramis
Chris Reive, Jordan Ramis
Keith Johnson, DEQ
Paul Seidel, DEQ
Henning Larsen, DEQ
Dan Hafley, DEQ
Jenn Peterson, DEQ
Mike Poulsen, DEQ
Sean Sheldrake, USEPA
Eva DeMaria, USEPA
Lance Peterson, CDM
Scott Coffey, CDM
Bob Wyatt, NW Natural
Patty Dost, Pearl Legal Group LLC
Sarah Riddle, Pearl Legal Group LLC
John Renda, Anchor QEA, LLC
Ben Hung, Anchor QEA, LLC
Jen Mott, Anchor QEA, LLC
Matt Wilson, Anchor QEA, LLC
Carl Stivers, Anchor QEA, LLC
John Edwards, Anchor QEA, LLC
Mike Gefell, Anchor QEA, LLC
Todd Thornburg, Anchor QEA, LLC
Ben Johnson, Anchor QEA, LLC
Halah Voges, Anchor QEA, LLC
Sarah Currin-Moles, Anchor QEA, LLC
Bruce Marvin, Geosyntec
Cindy Bartlet, Geosyntec
Vipul Srivastava, Geosyntec
Rob Ede, Hahn and Associates, Inc.

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-15-85	06/13/11	NM	5.56	
WS-15-85	07/22/11	NM	4.82	
WS-15-85	08/17/11	NM	5.20	
WS-15-85	09/16/11	NM	5.30	
WS-15-85	10/13/11	NM	5.95	
WS-15-85	11/28/11	NM	4.70	
WS-15-85	12/19/11	NM	4.50	
WS-15-85	01/16/12	NM	4.48	
WS-15-85	02/28/12	NM	3.45	
WS-15-85	03/19/12	NM	3.76	
WS-15-85	04/06/12	NM	3.30	
WS-15-85	05/15/12	NM	3.12	
WS-15-85	06/06/12	NM	2.70	
WS-15-85	07/06/12	NM	2.29	
WS-15-85	07/13/12	NM	1.72	
WS-15-85	07/20/12	NM	1.31	
WS-15-85	07/27/12	NM	0.40	
WS-15-85	08/10/12	NM	0.25	
WS-15-85	08/17/12	NM	0.10	
WS-15-85	08/23/12	NM	0.05	
WS-15-85	08/30/12	NM	0.21	
WS-15-85	09/07/12	28.40	0.17	
WS-15-85	09/13/12	29.88	0.15	
WS-15-85	09/21/12	28.75	0.15	
WS-15-85	09/26/12	29.29	0.18	
WS-15-85	10/04/12	32.25	0.28	
WS-15-85	10/12/12	33.75	0.21	
WS-15-85	10/19/12	32.10	0.21	
WS-15-85	10/26/12	31.80	0.15	
WS-15-85	11/02/12	30.18	0.15	
WS-15-85	11/09/12	33.10	0.20	
WS-15-85	12/05/12	23.50	T	
WS-15-85	02/18/13	31.99	0.80	
WS-15-85	04/15/13	27.12	1.30	
WS-15-85	06/12/13	25.86	1.69	
WS-15-85	08/09/13	27.12	1.80	
WS-15-85	10/21/13	32.45	2.00	
WS-15-85	12/17/13	28.44	1.60	
WS-15-85	02/25/14	25.95	1.45	
WS-15-85	04/14/14	26.20	1.70	
WS-15-85	06/06/14	25.15	1.24	
WS-15-85	08/29/14	28.58	2.40	

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-15-85	10/09/14	30.38	1.50	
WS-15-85	12/19/14	30.36	1.77	
WS-15-85	02/20/15	25.00	2.20	
WS-15-85	04/24/15	31.16	1.63	
WS-15-85	06/05/15	28.38	1.40	
WS-15-85	08/03/15	29.83	1.05	
WS-15-85	10/05/15	31.75	1.50	
WS-15-85	12/01/15	30.21	1.20	
WS-15-85	02/08/16	29.45	1.20	
WS-15-85	04/18/16	25.81	1.10	
WS-15-85	06/27/16	27.20	1.05	0.02 ft LNAPL
WS-15-85	08/01/16	28.72	0.55	0.03 ft LNAPL
WS-15-85	10/05/16	30.35	0.55	0.05 ft LNAPL
WS-15-85	12/01/16	26.08	0.80	
WS-15-85	02/07/17	25.85	1.20	0.04 ft LNAPL
WS-15-85	04/24/17	22.39	1.20	Trace LNAPL
WS-21-131	05/16/16	26.89	0.00	
WS-23-116	12/19/14	25.78	T	
WS-31-106	11/04/14	27.51	2.50	
WS-31-106	11/25/14	31.26	2.80	
WS-31-106	12/19/14	30.55	2.11	
WS-31-106	12/19/14	30.55	2.10	
WS-31-106	01/26/15	26.65	12.87	
WS-31-106	02/20/15	24.71	5.05	
WS-31-106	04/24/15	31.19	9.45	
WS-31-106	06/05/15	29.51	12.85	
WS-31-106	08/03/15	32.43	26.19	
WS-31-106	10/05/15	33.85	25.05	
WS-31-106	12/01/15	33.25	25.30	
WS-31-106	12/15/15	48.00	4.06	
WS-31-106	01/26/16	26.65	12.87	
WS-31-106	02/08/16	28.10	12.05	
WS-31-106	03/09/16	27.14	12.86	
WS-31-106	04/18/16	26.35	13.43	
WS-31-106	05/16/16	27.38	12.25	Pre-removal
WS-31-106	05/16/16	44.26	0.65	Post-removal
WS-33-81	01/17/11	NM	T	
WS-33-81	02/14/11	NM	0.10	
WS-33-81	03/17/11	NM	T	
WS-33-81	04/12/11	NM	0.25	
WS-33-81	05/19/11	NM	0.15	
WS-33-81	06/13/11	NM	0.10	

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-33-81	07/22/11	NM	0.85	
WS-33-81	08/17/11	NM	1.30	
WS-33-81	09/16/11	NM	0.95	
WS-33-81	10/13/11	NM	1.50	
WS-33-81	11/28/11	NM	1.70	
WS-33-81	12/19/11	NM	1.90	
WS-33-81	01/16/12	NM	1.32	
WS-33-81	02/28/12	NM	2.40	
WS-33-81	03/19/12	NM	2.40	
WS-33-81	04/06/12	NM	1.38	
WS-33-81	05/15/12	NM	1.85	
WS-33-81	06/06/12	NM	1.60	
WS-33-81	07/06/12	NM	1.50	
WS-33-81	07/13/12	NM	0.55	
WS-33-81	07/20/12	NM	0.95	
WS-33-81	07/27/12	NM	0.95	
WS-33-81	08/10/12	NM	1.40	
WS-33-81	08/17/12	NM	0.75	
WS-33-81	08/23/12	NM	0.60	
WS-33-81	08/30/12	NM	1.00	
WS-33-81	09/07/12	31.53	0.90	
WS-33-81	09/13/12	32.10	0.85	
WS-33-81	09/21/12	31.70	0.65	
WS-33-81	09/26/12	32.31	0.95	
WS-33-81	10/04/12	33.85	0.83	
WS-33-81	10/12/12	32.70	1.04	
WS-33-81	10/19/12	32.30	1.15	
WS-33-81	10/26/12	32.00	1.21	
WS-33-81	11/02/12	30.57	1.55	
WS-33-81	11/09/12	32.40	1.10	
WS-33-81	12/05/12	27.17	1.30	
WS-33-81	02/18/13	25.92	2.65	
WS-33-81	04/16/13	25.85	5.65	
WS-33-81	06/12/13	29.48	6.26	
WS-33-81	08/09/13	30.16	8.40	
WS-33-81	10/21/13	32.10	9.46	
WS-33-81	12/17/13	32.37	13.60	
WS-33-81	02/25/14	29.12	20.35	
WS-33-81	04/14/14	27.85	20.00	
WS-33-81	06/06/14	25.73	25.03	
WS-33-81	08/28/14	30.38	24.09	
WS-33-81	08/28/14	NM	0.70	

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-33-81	08/29/14	30.54	2.25	
WS-33-81	09/12/14	31.60	6.95	
WS-33-81	09/18/14	31.80	7.35	
WS-33-81	09/25/14	30.72	7.80	
WS-33-81	10/03/14	31.55	8.30	
WS-33-81	10/09/14	29.91	8.30	
WS-33-81	10/16/14	30.45	9.40	
WS-33-81	10/24/14	29.99	9.90	
WS-33-81	10/30/14	30.10	10.00	
WS-33-81	11/05/14	29.80	10.50	
WS-33-81	11/14/14	30.85	10.30	
WS-33-81	11/20/14	30.63	10.00	
WS-33-81	11/25/14	28.80	8.00	
WS-33-81	12/03/14	28.52	12.60	
WS-33-81	12/13/14	28.64	11.20	
WS-33-81	12/19/14	29.04	11.80	
WS-33-81	01/26/15	25.35	11.09	
WS-33-81	02/20/15	26.42	10.30	
WS-33-81	03/24/15	27.59	12.25	
WS-33-81	04/24/15	29.81	10.25	
WS-33-81	05/21/15	28.65	12.05	
WS-33-81	06/05/15	29.56	11.35	
WS-33-81	07/09/15	30.47	11.85	
WS-33-81	08/03/15	29.95	12.05	
WS-33-81	09/09/15	31.68	13.00	
WS-33-81	10/05/15	31.68	12.55	
WS-33-81	11/09/15	29.43	12.80	
WS-33-81	12/01/15	28.80	14.15	
WS-33-81	01/26/16	25.35	11.09	
WS-33-81	02/08/16	27.33	11.80	
WS-33-81	03/09/16	26.31	12.63	
WS-33-81	04/18/16	26.07	14.91	
WS-33-81	05/16/16	26.13	12.85	Pre-removal
WS-33-81	05/16/16	43.96	0.25	Post-removal
WS-33-81	06/27/16	29.22	7.30	0.01 ft LNAPL
WS-33-81	08/01/16	29.02	7.30	0.01 ft LNAPL
WS-33-81	10/05/16	30.55	7.20	0.04 ft LNAPL
WS-33-81	12/01/16	26.40	9.95	Pre-removal
WS-33-81	12/01/16	39.30	NM	Post-removal
WS-33-81	02/07/17	25.42	6.00	
WS-33-81	04/24/17	21.49	9.00	Trace LNAPL
WS-43-36	04/12/11	NM	2.05	

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-43-36	05/19/11	NM	10.34	
WS-43-36	06/13/11	NM	8.20	
WS-43-36	07/22/11	NM	8.06	
WS-43-36	08/17/11	NM	7.98	
WS-43-36	09/16/11	NM	8.34	
WS-43-36	10/13/11	NM	8.60	
WS-43-36	11/28/11	NM	8.69	
WS-43-36	12/19/11	NM	8.50	
WS-43-36	01/16/12	NM	8.55	
WS-43-36	02/28/12	NM	8.71	
WS-43-36	03/19/12	NM	7.91	
WS-43-36	04/06/12	NM	8.11	
WS-43-36	05/15/12	NM	8.48	
WS-43-36	06/06/12	NM	8.20	
WS-43-36	07/06/12	NM	7.76	
WS-43-36	07/13/12	NM	7.09	
WS-43-36	07/20/12	NM	6.45	
WS-43-36	07/27/12	NM	5.75	
WS-43-36	08/10/12	NM	7.53	
WS-43-36	08/17/12	NM	6.21	
WS-43-36	08/23/12	NM	5.10	
WS-43-36	08/30/12	NM	4.88	
WS-43-36	09/07/12	13.18	4.98	
WS-43-36	09/13/12	13.27	4.33	
WS-43-36	09/21/12	13.55	4.88	
WS-43-36	09/26/12	13.72	4.02	
WS-43-36	10/04/12	14.02	4.80	
WS-43-36	10/12/12	14.00	3.49	
WS-43-36	10/19/12	14.35	5.40	
WS-43-36	10/26/12	14.43	5.05	
WS-43-36	11/02/12	14.37	5.63	
WS-43-36	11/09/12	14.50	NA	
WS-43-36	12/05/12	13.39	8.11	
WS-43-36	02/18/13	12.40	8.22	
WS-43-36	04/19/13	13.25	8.35	
WS-43-36	06/12/13	13.49	8.55	
WS-43-36	08/09/13	14.28	8.62	
WS-43-36	10/21/13	14.92	9.15	
WS-43-36	12/17/13	15.07	8.50	
WS-43-36	02/25/14	14.71	8.60	
WS-43-36	04/14/14	13.49	8.50	
WS-43-36	06/06/14	13.20	8.35	

Table
DNAPL Thickness Measurements at Selected Wells
Siltronic Corporation
Portland, Oregon

Location	Date	DTW (ft below TOC)	DNAPL thickness (ft)	Notes
WS-43-36	08/29/14	14.52	8.25	
WS-43-36	10/09/14	15.22	8.10	
WS-43-36	12/19/14	14.97	8.70	
WS-43-36	02/20/15	13.74	9.40	
WS-43-36	04/24/15	13.63	8.40	
WS-43-36	06/05/15	14.43	10.00	
WS-43-36	08/03/15	15.45	10.00	
WS-43-36	10/05/15	16.27	7.90	
WS-43-36	12/01/15	14.83	7.90	
WS-43-36	02/08/16	11.24	8.70	
WS-43-36	04/18/16	10.94	8.45	
WS-43-36	06/27/16	12.53	8.85	0.01 ft LNAPL
WS-43-36	08/01/16	13.35	8.15	
WS-43-36	10/05/16	14.78	8.80	
WS-43-36	12/01/16	14.02	9.93	
WS-43-36	02/07/17	11.66	7.30	
WS-43-36	04/24/17	9.21	7.45	

Notes:

ft = feet

ft below TOC = feet below top of casing.

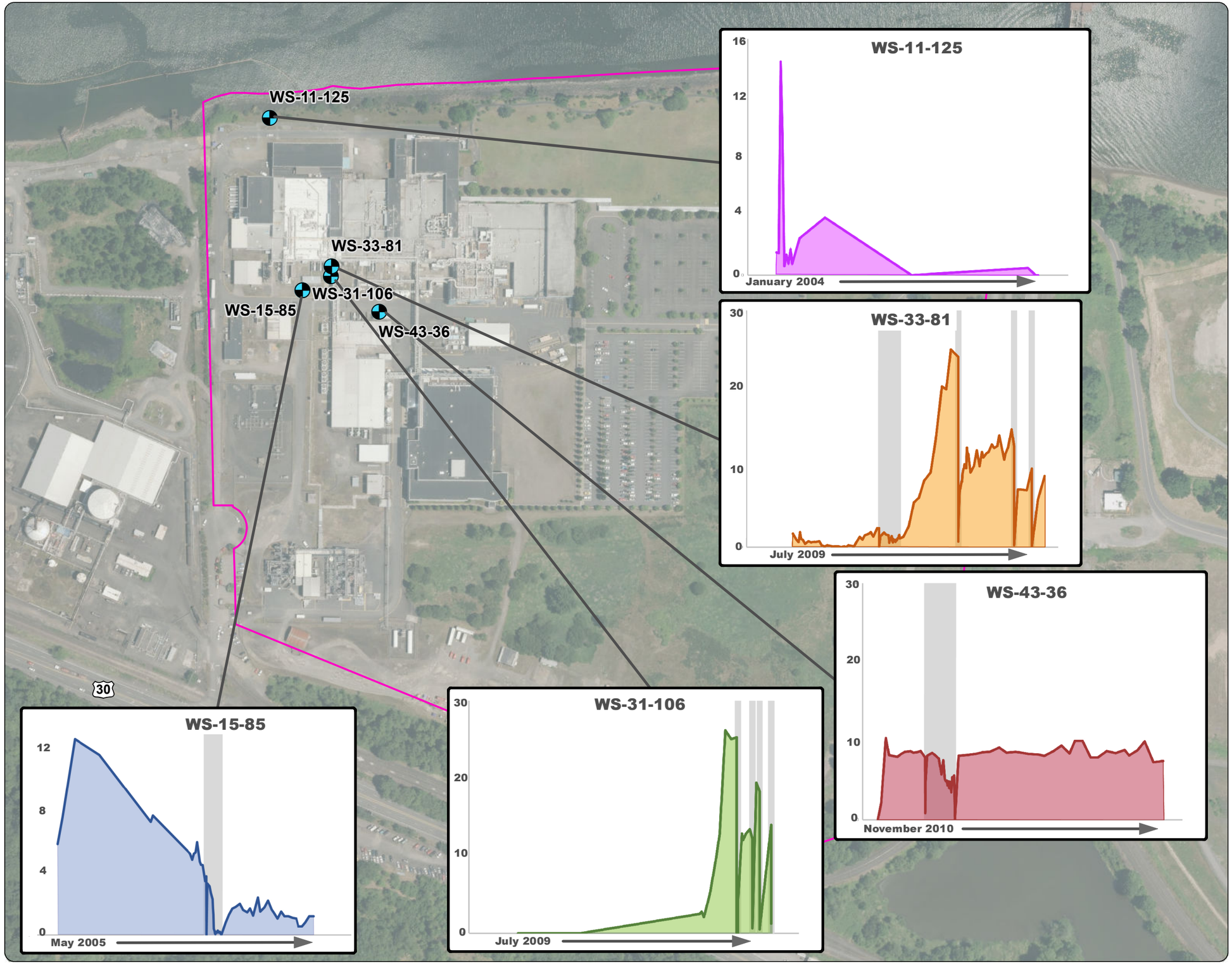
NA = Not Available, unable to obtain DTP reading at WS43-36 on 11/09/12.

NM = Not measured.

T = Trace amount detected.

Figure
PG&C Waste DNAPL Fluctuation Over Time

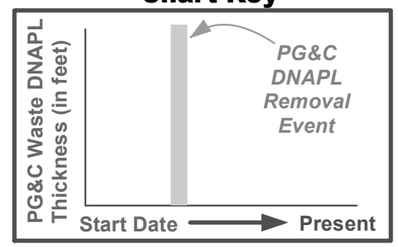
Siltronic Corporation
Portland, Oregon



Legend

- Monitoring Well
- Siltronic Property

Chart Key



Notes:
1. PG&C = Portland Gas & Coke.
2. DNAPL = dense nonaqueous-phase liquid.

0 150 300
Feet

Source: Aerial photograph obtained from Esri ArcGIS Online

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Print Date: 6/7/2017
Approved By: enaylor
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Project: 8128.02.01-02